FC1003E/03
E-band Converter with LO

Features

- 81-86 GHz TX frequency, 71-76 GHz and 81-86 GHz RX frequency
- Platform concept, easy to customize
- 1 to 6 GHz IF bandwidth
- Small size and weight
- Standard waveguide and SMA interfaces

Description

The FC1003E/02 forms the building block for E-band radio link applications. Each unit consists of one up- and one down-converter. The up- and down-converters operate independently. IF input/output is over SMA connectors and RF output/input is over WR12 waveguide.

The FC1003E/02 is manufactured in compliance with the ISO9001:2008 standard and the RoHS directive.

- Point-to-point or multi-point radio
- Multi-Gbps wireless transfer
- Measurement systems
- Any application requiring a high-quality mm-wave up and down converter

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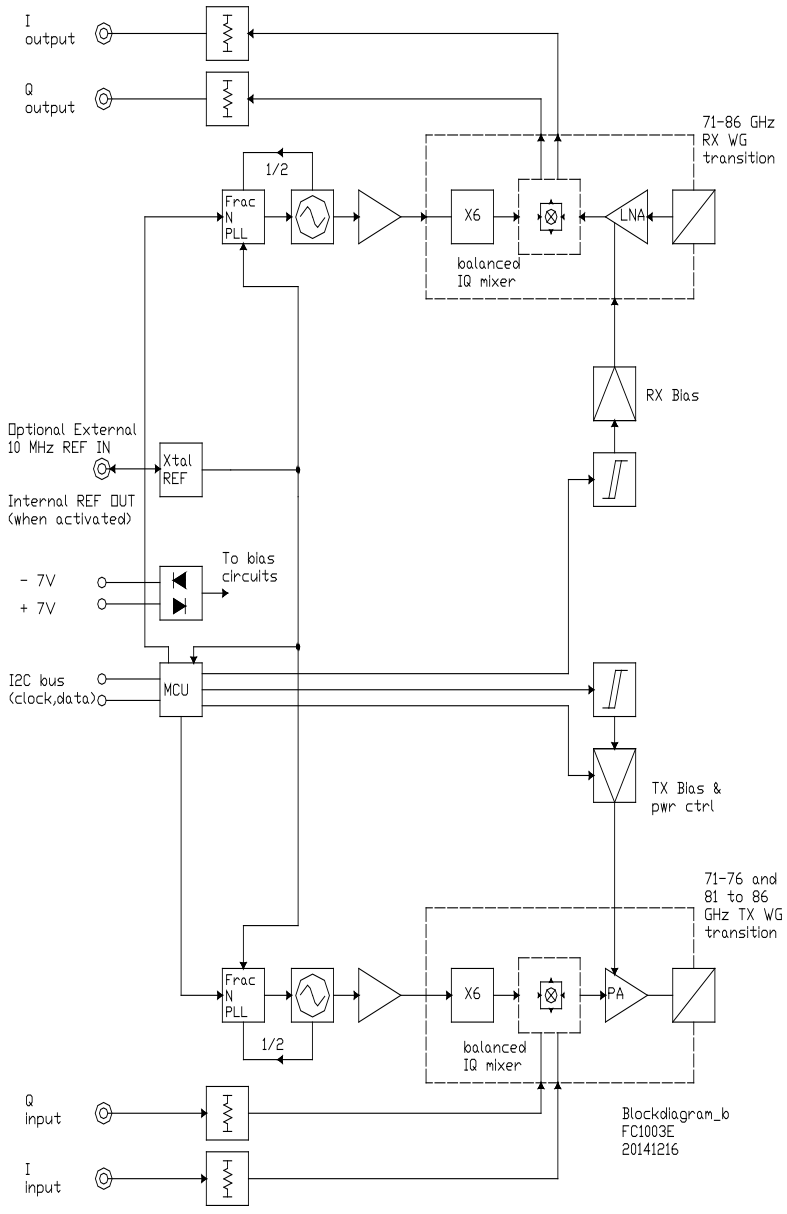
Block Diagram



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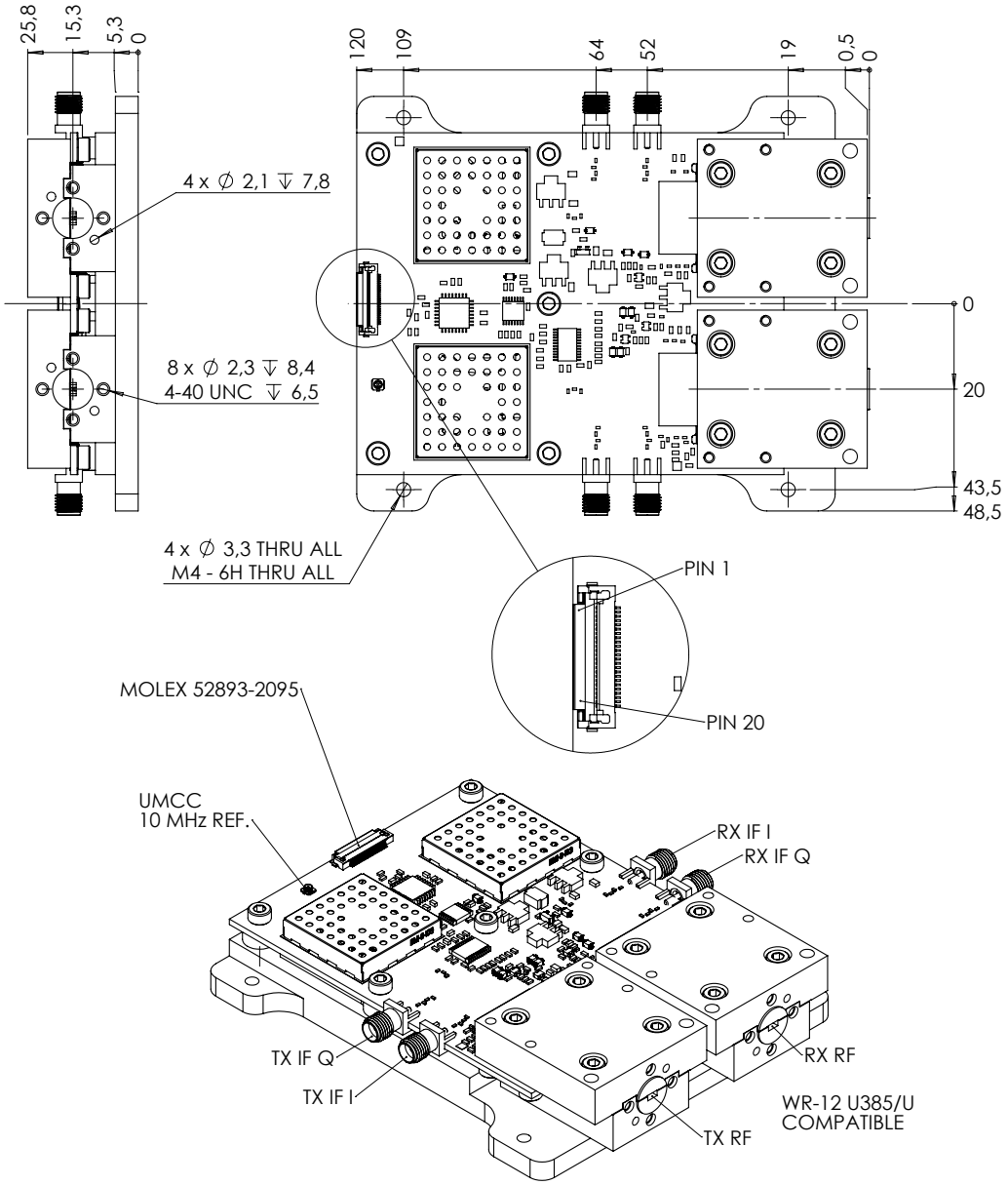
Drawing



Pin designations	
Pins	**Designator**
1, 6, 9, 12, 19	GND
2, 3, 4, 5	VDD, +7V
7, 8	VSS, -7V
18	I2C-SCL bus clock
20	I2C-SDA bus data
10, 11, 13, 14, 15, 16, 17	NC, no connect

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TX up-converter electrical specification

Parameter	Min	Typical	Max	Units
RF output frequency*	81		86	GHz
IF input frequency*	1		6	GHz
Gain, IF to RF*	15		45	dB
Gain variation within any 100MHz band*			1.5	dB
Gain control range		20		dB
Saturated output power*	15	18		dBm
Image rejection*	5			dB
Estimated noise power density at waveguide output **		-65		dBm/MHz
IF input return loss		15		dB
LO input frequency ***	11.8		14.4	GHz
LO input level		6		dBm

*Value production tested at room temperature; all other values indicative.
**Excluding spurious signals and LO leakage. The LO leakage varies with frequency, typically between -15 and 15 dBm.
***LO signal is entered at 1/6th of the operating frequency and internally multiplied.

Parameters refer to IF IQ SMA connector input and RF WR12 output.

TX up-converter maximum ratings

Parameter	Min	Typical	Max	Units
IF input power level at each SMA connector			3	dBm

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RX down-converter electrical specification

Parameter	Min	Typical	Max	Units
RF input frequency* 71 81			 76 86	 GHz GHz
IF output frequency*	1		6	GHz
Gain, RF to IF*				
71-76 GHz	5		25	dB
81-86 GHz	3		20	dB
Gain variation within any 100MHz band*			2.5	dB
Gain control range		20		dB
Noise figure (at max gain)*		8	11	dB
Image rejection**	-5	5		dB
IF output return loss		10		dB
RF input return loss		10		dB

*Value production tested at room temperature; all other values indicative.
**Image rejection can vary significantly from 71 to 86GHz. Best performance is obtained at lowest frequency range. Datasheet values are based on combining I and Q signals in a passive 90 degree hybrid coupler.
***LO signal is entered at 1/6th of the operating frequency and internally multiplied.

Parameters refer to RF WR12 input and IF IQ SMA output.

RX down-converter maximum ratings

Parameter	Min	Typical	Max	Units
RF input power level at WR12 interface			-30	dBm

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LO synthesizers

Parameter	Min	Typical	Max	Units
LO phase noise @ 100 kHz offset @ E-band*		-80		dBc/Hz
LO synthesizer frequency				
RXLO synthesizer frequency	72		82.75	GHz
TXLO synthesizer frequency	72		82.75	GHz
LO synthesizer step size @ V-band		0.25		MHz

* Phase noise is characterized at LO/6 and compensated by 15.5dB.

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Physical, Electrical and Environmental

Parameter	Min	Typical	Max	Units
Operating temperature, refers to backside of bottom plate	-30		55	°C
Storage temperature	-50		80	°C
Humidity			90	% relative @25°C
Shock	Meets EN 300 019-2-4			
Vibration	Meets EN 300 019-1-4 Class 4.1			
Power				
VSS voltage	-7.25		-6.75	V
VSS current consumption**		10	50	mA
VDD voltage	6.75		7.25	V
VDD current consumption**		1260	1300	mA
VPP voltage	14.75		15.25	V
VPP current consumption**		10	30	mA
Total power consumption**		9.5		W
Digital I/O***				
External pull-up voltage		3.3	3.5	V
External pull-up resistance		4.7		kW
Internal reference frequency		10		MHz
Internal reference frequency stability over temperature range*	-2.5		2.5	ppm
Internal reference accuracy Initial frequency tolerance, aging and supply pushing, temperature variation excluded	-3		3	ppm
Weight		450		g

* Temperature stability through stepwise correction of reference output frequency.
**Specified at room temperature with all sections of the converter active.
*** Digital I/O pins I2C-SCL and I2C-SDA are bidirectional open-drain lines that must be pulled up externally.
Please note: Bias sequencing is necessary. VSS must at all times be available when VDD is applied. Failure to provide VSS when VDD is applied may permanently damage the converter.

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Interfaces

Waveguide input/output WR 12	Compatible with UG-387/U
Control and bias connector	Molex 52893-2095
Converter control interface protocol	I2C, commands described in “Converter platform control interface B”
IF connectors	SMA female
External/internal reference connector	UMCC

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